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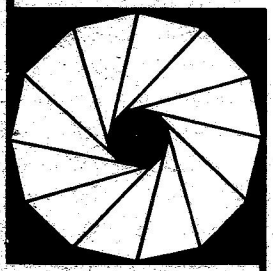

LIFE LIBRARY OF PHOTOGRAPHY

Photographer's Handbook

1 **Picture Taking Step by Step**
Using Your Camera
Tips for the Field
Getting the Most from Your Lenses
All about Films
Estimating Exposures
How to Use a Light Meter
Special Effects with Filters
Artificial Lighting
Tips from LIFE Photographers

2 **Developing and Printing**
How to Set up Your Own Darkroom
Developing Film
Making a Contact Sheet
Enlargements: Dodging and Burning
TIME-LIFE Photo Lab Hints

Published simultaneously in Canada.
Library of Congress catalogue card number 73-114406.

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1 | Picture Taking Step by Step

Photography is an art that can be practiced by anyone with a camera and some film. But, like all arts, it demands skill. The purpose of this handbook is to offer the amateur a quick and clear means of developing some basic skills and to serve as a handy reference manual that can be tucked in a pocket or camera bag or kept open on the darkroom counter. This first section begins with such seemingly simple but often overlooked things as handling a camera properly and taking care of your equipment, then progresses to the use of different kinds of lenses, films, light meters, filters and flash, and finally touches on some basics of picture taking itself.

How to Hold a Camera Steady

Probably more pictures are spoiled by an unsteady hand than by any other single cause; unless you are shooting at high shutter speeds even a slight shake or jiggle when you click the shutter will result in some loss of sharpness, if not actual blurring. There is no single "right" way to hold a camera, for not only are cameras designed in a wide variety of sizes and shapes, with the controls in different places, but people vary in what suits them best. Nevertheless, there are some guidelines to keep in mind.

On the opposite and following pages, LIFE photographer George Silk demonstrates how he holds a camera in different picture-taking situations, in each case keeping it steady, minimizing the burden of its weight and reducing chances of dropping it. "The main point," says Silk, "is to brace the camera so that you can shoot at shutter speeds as slow as 1/30 second without having the camera move when you press the shutter release. I try to make myself into a sort of tripod. I brace my feet comfortably but steadily, slightly apart, with one foot slightly ahead of the other; I also keep the elbow of the arm supporting the camera close to my body. In this way, anywhere I move, the camera moves with me, ready for the next picture."

Holding an Eye-Level Viewing Camera

In holding an eye-level camera, Silk cups the lens in his left hand, supporting the camera's weight yet leaving his fingers free to adjust focus and f-stops. His right hand helps steady the camera while his right index finger works the shutter release. Note the strap wound tightly around his wrist to help hold the camera and as a precaution against dropping it.

Some people prefer to hold their cameras with their right hands. When Silk does this, he keeps his right arm pressed against his ribs to steady the camera.

Holding a Camera with a Long Lens

With a heavy 300mm lens attached to his camera, Silk makes use of any support he can get. "By kneeling on one knee," he says, "I can hold the lens steady. My left elbow is braced on top of my left knee and I use the thumb and finger of my left hand to hold the camera, focus and change f-stops."

Kneeling for a horizontal shot with the 300mm lens, Silk again braces his elbow on his knee to provide support. For a standing shot *(right)* he tucks his elbow firmly against his ribs to hold camera and lens steady. With long lenses and slow shutter speeds in particular, Silk is careful to squeeze the shutter release gently to avoid jerking the camera.

Holding a Waist-Level Viewing Camera

Silk shows how the larger viewing screen of a twin-lens reflex enables him to focus with his eye some distance from the screen. For a shot requiring a slow shutter speed, Silk braces the camera against a low, flat surface *(left)*. To shoot over a crowd *(right)*, he holds the camera at arm's length, upside down.

Cradling the camera in both hands, with elbows against sides, Silk demonstrates a standard position for working with a twin-lens reflex. His entire body helps steady the camera and it is held close to his eye to make precise composition and focusing easier.

Before Shooting: A Checklist

Every photographer, even a skilled professional, occasionally makes careless mistakes, like shooting with an empty camera or forgetting to remove the lens cap. To avoid such fundamental errors, experienced photographers have developed mental checklists to run through before putting the camera to use. Here is one such list, suggested by the LIFE photographic staff:

1. Is the camera already loaded? Many a photographer has lost precious exposures because he opened the back of his camera to put in new film without checking to see that the camera was empty. Check the film window in the back of the camera or the automatic frame counter. If there is any doubt, test the film advance; if there is film in the camera you should be able to feel a slight resistance to turning. On cameras with rewind knobs, the knob should revolve if there is film in the camera.

2. How many exposures are left? If there are only a few frames remaining and you expect to be shooting rapidly, wind the film through and put in a new roll.

3. Is the camera free of dust and film chips? Before loading up with fresh film, look for loose fragments of film, which sometimes are broken off by the windup spool and jam the camera mechanism. Both chips and dirt can leave long scratches on new film as it moves through and dust on the film or the back of the lens can spot or blur pictures. To clean out the inside of your camera use a soft brush or special blower brush; you can do a good job simply by blowing into the camera and then gently wiping out any remaining dirt with a clean, wadded handkerchief laundered enough times to be free of lint.

4. Are you loading in subdued light? Instant-loading film cartridges and 35mm film cassettes are light-tight, but with regular roll film it is wise to load in the shade.

5. Is the film moving properly to the take-up spool? When you load a fresh roll of film, make certain that the film's tapered beginning, or leader, is firmly inserted in the take-up spool. Then advance the film at least one full frame while the camera back is open. If you use 35mm film, make sure that the sprockets remain engaged in the holes along the edges before closing the camera back.

6. Is the camera back tightly latched? After closing and latching the camera back, try to open it without releasing the locking mechanism.

7. Is the take-up spool turning? To be certain that the film is advancing properly, work the film-advance mechanism at least once, feeling for resistance. If the camera has a rewind knob, it should revolve. If not, open the camera and repeat step five.

8. Is the lens securely in place? If you are using a camera with interchangeable lenses, try to wiggle the lens barrel; if it moves at all, take the lens off and remount it properly.

9. Is the lens clean? Do *not* try to clean the lens with an ordinary cloth, which may scratch the glass. Do *not* use silicone-treated eyeglass tissues, which may damage the coating on the lens, or liquid eyeglass cleaners, which could get down into the lens mount and dissolve the cement behind the front element. The best way to clean a lens is to blow away dust, then "fog" the glass with your breath (or use a photographic lens cleaner) and finally wipe it gently with special photographic lens tissue.

10. Is your light meter set correctly for the speed of the film you are using?

11. Is your light-meter battery fully charged?

12. Have you removed your lens cap? Filter? With single-lens reflex and view cameras the lens cap poses no problem, since you cannot see anything on the viewing screen if the lens cap is on. But with other cameras you should always check to make certain that the lens cap is off. With all cameras, including single-lens reflex models, it is a good idea to take a quick look at the lens. You may find a filter left on it.

Camera and Film Tips

Protect your camera, as well as lenses, film, filters and other equipment, by keeping them in a photographic "gadget bag" (preferably one with compartments to avoid jumbling) or in a small airline or beach bag. Always use a lens cap. As further protection against dust, moisture, salt air and sand, it is a good idea to wrap camera and accessories in plastic food bags from the supermarket. If you want to take pictures on a snowy, rainy or dusty day without getting your camera wet or full of grit, just cut a hole or tear a corner off the bag to let the lens poke through; then put your hands in the open end to work the controls.

Use a lens shade to keep the direct rays of the sun from striking the film and causing streaks or halos. In an emergency you can simply cut a strip of cardboard about two inches wide (or use the collar cardboard from a man's shirt) and tape it into a tight cylinder around the lens. Make sure the cardboard is not so wide that it cuts off the viewing angle of the lens you are using.

Keep film cool and dry before and after using (color film is especially vulnerable to heat and moisture). Don't leave film or a loaded camera near a heat source indoors, or in the glove compartment or on the dashboard or rear window shelf of a car in the sun. Buy enough rolls of film at a time so that you don't run out; if you keep film for any length of time, as on a trip, seal it in a plastic food bag with a rubber band. (Film will keep even longer if you place the bag in a corner of the refrigerator; when taking it out for use, leave it sealed for an hour or so to avoid moisture condensing on the film and spotting it.)

If the film jams in your camera during a picture-taking session, you can use a coat as an emergency darkroom, as shown opposite, and remove the film without ruining the exposures you have already taken.

An Emergency Darkroom

1. Find a shady spot and place a dark or heavy coat on the ground, arms out and front side up. Button the coat and turn the collar over so that no light can enter.

2. Turn the coat over, front against the ground. Place the camera inside the coat from the bottom, along with an empty film can that has a light-tight top (if you don't have a film can, any light-proof container, or a piece of aluminum foil, will do.)

3. Roll the bottom of the coat under tightly to shut out light from that end. You are now ready to use your emergency "darkroom."

4. Put your arms in the coat sleeves and pick up the camera. Open the camera back, remove the jammed film and wind it around its spool or into its cassette, touching only the film edges. Place it in the can, screw the top on tightly and mark the can to indicate it contains exposed unrolled film.

Which Lens to Use

Most amateurs know that a long lens enlarges the view of distant objects, a short lens covers more area in a scene shot from up close and a normal lens serves in between. This is only the beginning of the utility of lenses, however, for their choice depends less on where the subject is than on how the photographer wants to treat it.

Pictures of people are most obviously influenced by variations in focal length. In portraits, the relationship of the sitter to the background can be changed markedly simply by switching from one lens to another, as the three examples opposite demonstrate. For the average shot of the family grouped around the grandparents, a normal lens serves well—unless the photograph must be taken indoors; then a wide-angle lens makes it much easier to get everybody in. But if you want to single one person out of a crowd, a long lens is essential; not only does its narrow field of view exclude the people surrounding him, but its restricted depth of field throws the background out of focus so that he seems to stand out alone. On the other hand, when you must take a number of pictures of different people moving around close to you—at a party, for example—the wide-angle lens's great depth of field eliminates the need for refocusing for every shot.

Landscapes, too, can be drastically altered by the choice of focal length. Suppose you are standing at the edge of a pond and across the water is a patch of woods, with a mountain range stretching in the background. With a normal lens you can compose a good general view. A wide-angle lens would include much more: the whole lake, perhaps even a bit of the shoreline with interesting rocks or a tree nearby, the woods and a wide panorama of the mountain range, which would seem very far away. A long lens would bring the woods up close, as if you were shooting from a boat on the pond, and mountains would become a dramatic backdrop behind the trees.

28mm lens

50mm lens

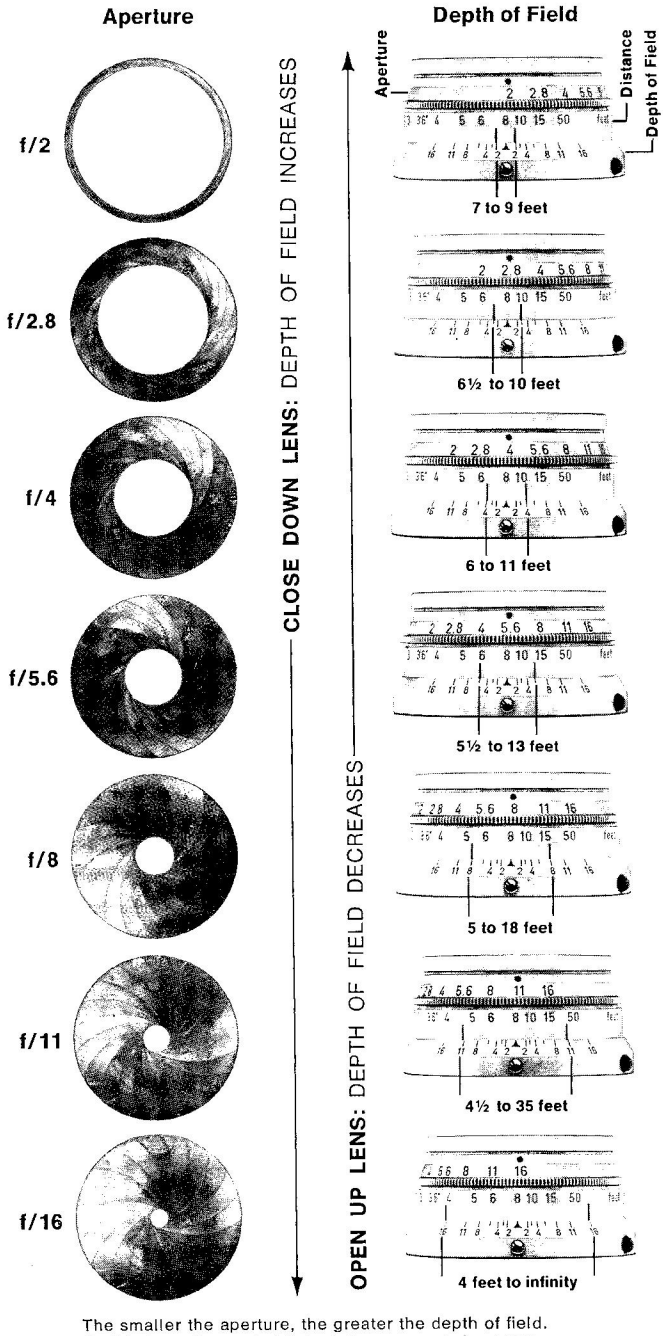
105mm lens

Three lenses, used with the same 35mm camera, create three distinctly different portraits. A wide-angle lens *(top)* shows a girl in the context of an apartment, suggesting her tastes and interests. A normal lens shows the girl more clearly but retains a sense of her surroundings. A long lens provides a close-up study in which the few surrounding objects have been reduced to soft patterns.

Depth of Field

Depth of field—how much of a given picture, from near to far, will appear sharp—is one of the critical factors to consider in choosing lenses to create different effects. If all of a scene—for example, a person standing in front of an interesting view—is important to the picture, great depth of field is desirable. But if only the person is of interest, a shallow depth of field will focus attention on him and make him stand out from the background. Depth of field is greater the shorter the focal length of the lens. Thus wide-angle lenses will reproduce a greater portion of a scene in front of and behind the point of focus with acceptable clarity, while long lenses will reproduce a much smaller range in sharp detail, making it harder to focus but easier to throw backgrounds purposely out of focus. On all lenses depth of field increases as the size of the aperture decreases, and as you stand farther away from your subject. With subjects at close or medium distances, a setting of f/16 will usually give great sharpness throughout the picture; a setting of f/2 will make only the subject itself sharp and the background and foreground will be blurred.

When using a rangefinder-focusing camera, depth of field must be determined by referring to the scales engraved on the side of the lens *(illustrations opposite).* With cameras that provide through-the-lens focusing —single-lens reflexes and view cameras—the depth of field can be observed directly by examining the image shown on the ground glass when the lens has been set to the aperture that will be used for taking the picture. If a small aperture is to be used, however, the image on the ground glass may be too dim for easy composition and focusing. To avoid this problem, many single-lens reflex cameras are now equipped with automatic lenses that permit focusing at the widest aperture, to give an easily seen image, then close down to the preselected f-stop, to show actual depth of field, when a "depth-of-field preview" switch is pressed.



The smaller the aperture, the greater the depth of field. On this lens, focused at 8 feet, the range of sharpness extends only from 7 to 9 feet at f/2 but becomes 4 feet to infinity at f/16, as shown by the bracketing marks for each f-stop on the bottom ring.

A Guide to Black-and-White Films

To denote their "speeds," or relative sensitivity to light, all films are assigned an ASA number (after the American Standards Association, which coordinates and approves standards for the photographic industry). The higher the number, the faster the film. For example, a film rated ASA 100 reacts to light twice as fast as one rated ASA 50, half as fast as one rated ASA 200. The speed of a film, together with the lighting conditions, determines what combination of f-stops and shutter speeds you can use to get a properly exposed picture *(chart opposite).* In general, films with a fast ASA rating are "grainier" than slow films; that is, their images are made up of larger particles of silver. In enlargements graininess becomes visible as a faint gray mottling of the entire picture. But even films rated as fast as ASA 400 exhibit objectionable grain only when greatly enlarged.

Slow-speed film (ASA 25 to ASA 50) is excellent for brightly lighted scenes, such as tropical beaches or snowy landscapes, when you want fine detail, a rich gradation of tones and virtually no grain.

Medium-speed film (ASA 100 to ASA 200) offers great latitude in exposure; a setting a stop or two off the proper one will not prevent the making of a usable print. This is general-purpose film suitable to most subjects and lighting conditions.

Fast film (ASA 400-500) also provides great latitude in exposure and is best for taking pictures when light is dim or fast action demands high shutter speeds.

Super-fast film (ASA 1000 to ASA 3000) can be used to take pictures in extremely dim light—as little as that given off by a single candle. With these films, however, even small enlargements may not exhibit the definition that a slower film would give.

Black-and-White Film Speeds and Basic Exposures

	Manufacturer and Film Name	ASA Rating	Basic Exposure Combination for Average Daylight[1] F-Stop	Shutter Speed (sec.)
SLOW SPEED	AGFA Isopan IFF	25	f/8	1/125
	KODAK Panatomic-X	32	f/8-f/11	1/125
	ILFORD Pan F	50	f/11	1/125
MEDIUM SPEED	AGFA Isopan ISS	100	f/16	1/125
	Agfapan	100	f/16	1/125
	PERUTZ Perutz 21	100	f/16	1/125
	GAF All-Weather Pan	125	f/16	1/125
	Versapan	125	f/16	1/125
	ILFORD FP4	125	f/16	1/125
	KODAK Plus-X Pan	125	f/16	1/125
	Verichrome Pan	125	f/16	1/125
FAST SPEED	AGFA Isopan Ultra ISU	400	f/16	1/500
	ILFORD MP4	400	f/16	1/500
	KODAK Tri-X Pan	400	f/16	1/500
	GAF Super Hypan	500	f/16	1/500
SUPER-FAST SPEED	AGFA Agfapan	1000	Intended for use under very poor lighting conditions.	
	Isopan Record	1000		
	KODAK Royal-X (120)	1250		
	2475 Recording	1000-3000		

[1] The same basic exposures can be made by decreasing the aperture by one or more stops and increasing the shutter speed by the equivalent number of settings (or vice versa). For example, a recommended exposure of f/16 and 1/125 second can also be made at f/11 and 1/250 second, f/8 and 1/500 or f/22 and 1/60 second *(pages 18-19)*.

A Guide to Color Films

Like black-and-white films, color films are rated with ASA numbers according to their light sensitivity. Unlike black-and-white films, however, color films are made in two basic types: color negative film and color reversal film.

Color negative film *(chart opposite)* produces negatives and prints just like black-and-white film. Because these prints can be framed, pasted in albums or carried in wallets—and require no special equipment for viewing—color negative film is especially popular among amateurs. It is also the easiest kind of color film to use because minor errors in exposure can be corrected by lab technicians. Amateur color negative films are made for use in light that approximates the spectrum of daylight: natural light outdoors, electronic flash and blue-tinted flash. They can be employed with ordinary artificial lights or untinted flash, but a color-correcting filter should then be used for best results. (Polacolor film, which produces color prints but no negatives, can be used only with Polaroid cameras, or with cameras fitted with special backs to receive this kind of film.)

Color reversal film produces transparent positives (there is no negative). These transparencies are meant mainly for use as slides and are best seen through a slide projector or viewer. (With special processing color prints can be made from slides, as slides can also be made from color negatives.) Color reversal film produces the most natural color reproduction and is made in several types, each with a different color balance. Daylight, or "outdoor," film is color-balanced for natural light, electronic flash and blue-tinted flash. With floodlights specified 3400K *(page 29),* Type A "indoor" film is used. There is also a Type B "indoor" film, color-balanced for floodlights specified 3200K. Of course, any color film can be used in any kind of light if the appropriate color-correcting filter is placed over the camera lens.

Color Film Speeds and Basic Exposures

Color Negative Film (for Color Prints)

Manufacturer and Film Name	Rating ASA	Basic Exposure Combination for Average Daylight[1] F-Stop	Shutter Speed (sec.)
3M Dynachrome	64	f/11	1/125
AGFA Agfacolor CNS	80	f/11-16	1/125
GAF Color Print Film	80	f/11-16	1/125
KODAK Kodacolor-X Ektacolor S	80 100	f/11-16 f/16	1/125 1/125

Color Reversal Film (for Color Slides)

3M Dynachrome	25	f/8	1/125
KODAK Kodachrome II	25	f/8	1/125
AGFA Agfachrome CT 18 Agfachrome CT Professional	50 50	f/11 f/11	1/125 1/125
KODAK Ektachrome Professional	50	f/11	1/125
3M Dynachrome 64	64	f/11	1/125
GAF Anscochrome 64	64	f/11	1/125
KODAK Ektachrome-X Kodachrome-X	64 64	f/11 f/11	1/125 1/125
KODAK High Speed Ektachrome	160	f/11	1/250
GAF Anscochrome 200 Anscochrome 500	200 500	f/16 f/16	1/250 1/500

For use with artificial light

TYPE A (for use with 3400K lamps)		Varies according to distance of subject from lamp and type of lamp; use an exposure meter.
KODAK Kodachrome II Professional Type A	40	
TYPE B (for use with 3200K lamps)		
AGFA Agfachrome Ck 20 Agfachrome Ck	80 80	
GAF Anscochrome T/100	100	
KODAK High-speed Ektachrome	125	

[1] See footnote, page 15.

A Guide to Exposure

If you do not own a light meter or a camera with automatic exposure control—or if your meter should break down—you can calculate exposures by a simple method recommended by LIFE photographer J. R. Eyerman:

A front-lighted subject in full sunlight takes a basic exposure combination of f/16 at whatever shutter speed comes closest numerically to the reciprocal of the ASA rating of your film. Suppose, for example, your film is rated at ASA 100. The reciprocal is 1/100 and the closest shutter speed is 1/125. Thus, the basic exposure combination is f/16 at 1/125. The same exposure can be made with higher or lower speeds, varying the aperture: f/11 at 1/250, f/8 at 1/500 or f/22 at 1/60.

A side-lighted subject requires more exposure: the basic combination is the shutter speed nearest the film ASA number at f/11. With ASA 100 film, this would mean a setting of f/11 at 1/125 (or f/8 at 1/250, f/5.6 at 1/500).

A back-lighted subject requires still more exposure; the basic combination is the shutter speed nearest the film ASA number at f/8. With ASA 100 film, this would mean a setting of f/8 at 1/125 (or f/5.6 at 1/250, f/4 at 1/500).

To prevent blurring caused by camera shake, avoid shutter speeds slower than 1/125 if you can. When using films that have a low ASA rating, adjust the basic exposure combination so that the 1/125 shutter speed is used, opening the lens as necessary. However, remember that large lens openings like f/2.8 and f/4 restrict depth of field. If the picture requires depth of field, adjust the exposure combinations for a higher f-stop with a lower shutter speed. Speeds as slow as 1/30 can be used if you keep the camera steady. For slower speeds, use a tripod or brace your camera securely on a bunched coat, a fence or any solid base.

Trial Exposures for Different Picture Situations

	Film ASA Rating (Black and White and Color)				
	25-32	30-64	80-125	160-250	400-500
	Shutter Speed (sec.) and F-Stop				
Snow, desert, beach and other very bright daylight scenes	1/125 f/11	1/125 f/16	1/250 f/16	1/500 f/16	1/500 f/22
Normal daylight (Front-lighted)	1/125 f/8	1/125 f/11	1/125 f/16	1/250 f/16	1/500 f/16
Light overcast sky	1/125 f/4	1/125 f/5.6	1/125 f/8	1/250 f/8	1/500 f/8
Dark overcast sky or rain	1/125 f/2.8	1/125 f/4	1/125 f/5.6	1/250 f/5.6	1/500 f/5.6
At sunrise[1]	1/125 f/4	1/125 f/5.6	1/125 f/8	1/250 f/8	1/500 f/8
At sunset[1]	1/125 f/2.8	1/125 f/4	1/125 f/5.6	1/250 f/5.6	1/500 f/5.6
At twilight[1]	1/125 f/2	1/125 f/2.8	1/125 f/4	1/250 f/4	1/500 f/4
Interiors, bright artificial light	1/8 f/2.8	1/15 f/2.8	1/30 f/2.8	1/60 f/2.8	1/125 f/2.8
Interiors, average artificial light	1/2 f/2.8	1/4 f/2.8	1/8 f/2.8	1/15 f/2.8	1/30 f/2.8
School auditorium stage, spotlighted	1/4 f/2.8	1/8 f/2.8	1/15 f/2.8	1/30 f/2.8	1/60 f/2.8
Brightly lit street scenes at night	1/8 f/2.8	1/15 f/2.8	1/30 f/2.8	1/60 f/2.8	1/125 f/2.8
Floodlighted buildings at night	8 sec. f/2.8	4 sec. f/2.8	2 sec. f/2.8	1 sec. f/2.8	1/2 f/2.8
Outdoor sports events at night, floodlighted	1/8 f/2.8	1/15 f/2.8	1/30 f/2.8	1/60 f/2.8	1/125 f/2.8
Black and white or color TV[2]	NR	1/15 f/2	1/15 f/2.8	1/30 f/2.8	1/60 f/2.8
Lightning bolts or fireworks[3]	T or B f/2.8	T or B f/2.8	T or B f/2.8	T or B f/2.8	T or B f/2.8
Small town at night from a distance	12 sec. f/2	12 sec. f/2.8	8 sec. f/2.8	3 sec. f/2.8	2 sec. f/2.8-4
Landscapes by moonlight (with full moon)	45 sec. f/2.8	45 sec. f/2.8	22 sec. f/2.8	8 sec. f/2.8	4 sec. f/2.8

[1] If shooting directly into sun, decrease exposure 1 to 3 times depending on intensity of light. Light changes rapidly at these times; keep rechecking your meter.

[2] Do not use flash when photographing TV or it will obscure the image on the screen. Do not use a shutter speed faster than 1/30 with focal plane shutter or diagonal "scanning lines" will become visible in the picture. If shooting in color, use daylight type film.

[3] To capture lightning bolts or fireworks, set your shutter at T (time) or B (bulb), and open the shutter; close it as soon as the lightning or fireworks are over.

NR = not recommended.

Using a Light Meter

Light meters help set exposure by gauging the light available to reach the film, but they measure the light and indicate their measurements in many different ways. In some automatic cameras the meter does all the work of setting aperture or shutter (or both) for correct exposure; others have simple "yes-no" meters that signal the photographer or lock the shutter release when there is not enough light for a picture. Many 35mm single-lens reflex cameras measure light entering the lens, indicating light intensity by the position of a bar visible in the viewfinder; to set for correct exposure, f-stops and/or shutter speeds are changed until a second bar lines up with the first.

Most of these built-in meters and most separate ones are averaging meters; they measure the average intensity of the light reflected from the scene. In the picture below at left, for example, the boy's face is reflecting more light than his jacket; the meter takes in both and gives a reading in between. There are times, however, when an average reading can mislead the photographer. In the

Even sunlight illuminates both the boy and the background. Whatever the meter reads is the setting to use on your camera.

Even shade produces a similar situation. Because both boy and background are equally lighted, the meter reading is again correct.

picture at the right, below, the boy is in shade but behind him is a brightly lighted garage door. Now the boy's face needs more exposure than the background—and this is something an averaging meter will not point out.

To resolve this problem, some cameras have center-weighted meters, which give more value to the light being reflected from the central portion of the scene where the main subject usually is. Others have meters that can take an average reading or switch to a spot reading, one that includes only a small area at the center of the picture. In the photograph at the right, below, a spot reading of the boy's face would be close to the proper exposure for the whole picture. (In addition to the common types of built-in meters there are separate hand-held meters and meters that clip onto the top of some makes of cameras, coupling with the shutter-speed dial. Some professionals also use expensive separate spot meters that gauge only a tiny central section of the scene, as well as incident-light meters that gauge exposure by measuring all the light falling on the scene rather than light reflected from particular objects.)

"The meter is a great tool," says LIFE photographer Ralph Morse, "but remember, it is just a dumb mechanical instrument. You must use your experience and judgment to interpret it." In the pictures below and opposite, Morse illustrates four common lighting situations and shows how to interpret the readings an averaging meter can be expected to give.

Side lighting: Move in, take a reading off the sunny side of the face, then off the shaded garage door and strike a mean.

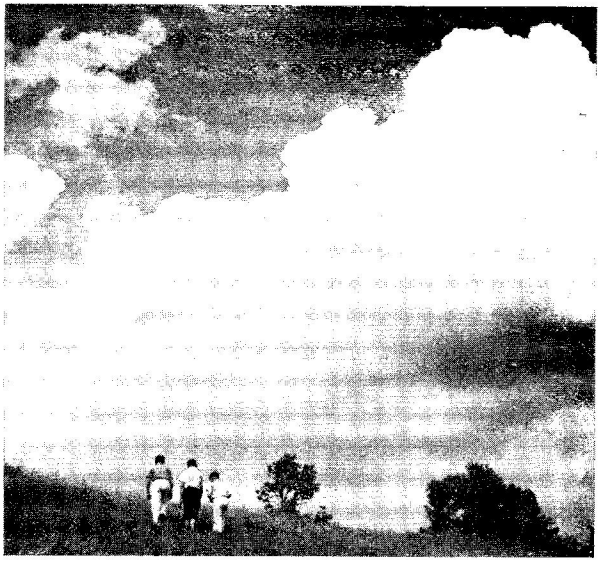
Uneven lighting, boy in shade, background in sun. Move in close to the boy, take a reading off his face and close down ½ f-stop.

A Guide to Filters

Most filters are thin discs of colored glass or polarizing material that can be attached to the front of a lens; they are used to alter the tones in which the colors of objects —flowers, sky, skin—are recorded on black-and-white film. By selectively blocking parts of the spectrum in the incoming light, they can darken the sky so clouds stand out *(below),* make a person's face seem tanned, or counterbalance variations in film sensitivity to give a natural tonal contrast in textile patterns. To make up for the blocked light, it is necessary to increase the lens opening (or exposure time) as indicated in the chart opposite.

Most popular among amateur photographers is the medium-yellow or orange filter, which blocks blue light and compensates for the film's oversensitivity to this color. Without a filter, a blue sky tends to come out white, indistinguishable from the white of clouds, and clouds disappear to leave a pale and uninteresting blank.

Cloud details are emphasized by a medium-yellow filter.



Filters and Settings for Black-and-White Panchromatic Films

	Desired Effect	Recommended Filter	Increase Aperture[1]
Outdoor portraits	Natural skin tones and sky	Light green	2 stops
Indoor portraits	Darker skin tones or tanned look	Light green	2 stops
	Slightly lighter skin tones	Medium yellow	1 stop
Garden or pastoral scenes	Lighter yellow flowers, darker leaves	Medium yellow	1 stop
	Slightly darker flowers, lighter leaves	Light green	2 stops
Landscapes	Cut down atmospheric haze	Medium yellow	1 stop
Sky and clouds	Slightly darker sky, slightly whiter clouds	Medium yellow	1 stop
	Darker sky, whiter clouds	Orange[2]	1½ stops
	Darker sky, whiter clouds	Polarizing[3]	2 stops
	Dark sky, brilliant white clouds	Red[2]	3 stops
	Nearly black sky, bleached white clouds	Dark red[2]	4 stops
Sand or snow with sunlight and blue sky	Natural rendition of colors	Medium yellow	1 stop
	Accentuated tonal contrast	Orange[2]	1½ stops
Glass	Eliminating reflections to remove glare	Polarizing	2 stops

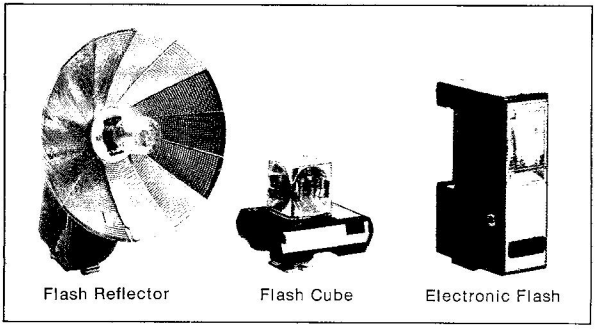
[1] The same effect can be produced by doubling the exposure time instead of opening the lens one stop.

[2] Orange, red and dark red filters produce unnatural skin tones.

[3] Not effective when sun is directly overhead.

A Guide to Flash Bulbs, Cubes and Electronic Flash

To get added illumination for indoor or outdoor picture taking, you can use flash bulbs, flash cubes or electronic flash units (sometimes called "strobes"). Each provides a measured quantity of intense light that can be synchronized to flash during the brief instant the camera shutter opens. Some cameras are equipped with sockets in which the cube or flash bulb is placed; others have tiny



synchronization sockets marked "M", "X" or "FP" to which flash holders are connected with an electrical wire. The "M" socket is generally used for bulbs and cubes, the "X" for electronic flash; on some cameras with focal-plane shutters the synchronization socket for bulbs and cubes is marked "FP."

Bulbs consume their filaments when flashed and can be used only once. They need separate reflectors that have a polished or a textured finish. Polished reflectors cast a slightly stronger light, but textured ones give a softer, more even illumination. Most bulbs are tinted blue so that the color of their light approximates that of daylight.

A cube is simply four tiny bulbs built into a single unit with a reflector behind each bulb and a plastic shield in front. The unit is turned after each flash, so that one cube can be used four times before it must be discarded.

Electronic flash—a tube containing gas that glows brightly when electrified—is re-usable and can be fired thousands of times. Many units now sell for less than $40, some for as little as $10. The most popular models draw their power from either household current or batteries of the type that can be recharged by plugging into a wall outlet. Even when the battery is fully charged, the circuit that causes the gas tube to glow must rebuild its voltage after each firing; this recovery time, which must be provided between exposures, may take as long as 10 seconds. Like blue flash bulbs, electronic flash emits light of a color resembling daylight and may be used with daylight color films indoors or out.

Using flash

A flash aimed directly at the subject often results in a picture with a bleached-out foreground and harsh shadows. More natural lighting can be achieved in two ways: tilt the flash unit if it swivels, or detach it from the camera and aim it at a light-colored ceiling, wall or reflector *(see below)* so that only soft reflected light hits the subject; hold the flash high above your head so that it bathes the subject in general light from above rather than hitting him full face. Flash can also be effectively used outdoors as a means of lightening, or "filling in," harsh shadows cast by the sun.

To diffuse flash for portraits, attach the unit *(arrow)* to a white umbrella and bounce its light off the underside; white cardboard or a wall can substitute for the professional's umbrella.

Exposure Settings for Flash

The chart opposite lists the most popular flash bulbs and cubes in use today. Each is listed according to the camera synchronization socket and the shutter-speed setting it requires. The last five columns show the apertures it requires with film of different ASA ratings. These apertures apply to flash used approximately 10 feet from the subject. When using flash at distances either closer to or farther from the subject than 10 feet, adjust the apertures in the following way:

At seven feet close the aperture one f-stop. If, for example, the chart recommends f/8 at 10 feet, the proper aperture at seven feet will be f/11.

At five feet close the aperture two f-stops from the setting for 10 feet. An f/8 setting at 10 feet becomes an f/16 setting at five feet.

At 14 feet open the aperture one f-stop from the setting for 10 feet. A setting of f/8 at 10 feet will become f/5.6 at 14 feet.

At 20 feet open the aperture two f-stops from the setting for 10 feet. If the chart indicates f/8 at 10 feet, shoot at f/4 at 20 feet.

Other factors influence choice of aperture, including the size of the room in which you are working and the color of its walls. In a very small room, close down one f-stop from the recommended setting. If the room is very large or if its walls are painted or stained a dark color, you should open up one f-stop from the recommended setting. If you are using a flash bulb with a textured reflector, you should also open the aperture one f-stop from the recommended setting.

If you are bouncing light—aiming the flash at the ceiling or walls instead of directly at the object being photographed—the distance that is used in calculating aperture is the distance light travels to reach the subject: from the flash unit to the reflecting surface to the subject. Thus, if the flash is aimed at a wall eight feet from the source of light and the wall is six feet from the subject, the flash-to-subject distance totals 14 feet, and an aperture one f-stop larger than the chart listing is needed.

Exposure Settings for Blue Flash at 10 Feet[1]

Type of Flash	Camera Sync. Socket	Shutter Speed (sec.)	Film ASA rating				
			25-32	40-64	80-125	160-250	400-500
Cubes	X	Up to 1/30	f/5.6	f/8	f/11	f/16	f/22
	M	1/60	f/4	f/5.6	f/8	f/11	f/16
		1/125	f/2.8 -4	f/4	f/5.6	f/8	f/11
AG-1B Bulbs	X	Up to 1/30	f/8	f/11	f/16	f/16 -22	f/22
	M	1/60	f/4	f/5.6 -8	f/8 -11	f/11 -16	f/16 -22
		1/125	f/4	f/5.6	f/8	f/11	f/16
M-2B Bulbs	X	Up to 1/30	f/5.6 -8	f/8 -11	f/11 -16	f/16 -22	f/22
Press 25B or No. 5B Bulbs	X or M	Up to 1/30	f/11	f/16	f/16 -22	f/22	NR
	M	1/60	f/8 -11	f/11 -16	f/16 -22	f/22	NR
		1/125	f/8	f/11	f/16	f/16 -22	NR
M3B or M-5B Bulbs	X, M or FP	Up to 1/30	f/11	f/11 -16	f/16 -22	f/22	NR
	M or FP	1/60	f/8	f/11	f/16	f/22	f/22
		1/125	f/8	f/8 -11	f/11 -16	f/16 -22	f/22
FP-26B or 6B Bulbs	FP	Up to 1/30	f/11	f/11 -16	f/22	f/22	NR
		Up to 1/125	f/5.6	f/8	f/8 -11	f/11 -16	f/16 -22

Exposure Settings for Electronic Flash at 10 Feet

Light Intensity in ECPS[2]	Camera Sync. Socket	Shutter Speed (sec.)[3]	Film ASA rating				
			25-32	40-64	80-125	160-250	400-500
1,800	X	Up to 1/60	f/5.6	f/8	f/11	f/16	f/22
2,500	X	Up to 1/60	f/5.6 -8	f/8 -11	f/11 -16	f/16 -22	f/22
3,500	X	Up to 1/60	f/8	f/11	f/16	f/16 -22	f/22
5,000	X	Up to 1/60	f/8 -11	f/11 -16	f/16 -22	f/22	NR
7,000	X	Up to 1/60	f/11	f/16	f/22	NR	NR

[1] Using a polished reflector. If you are using a textured reflector, open the lens one f-stop.

[2] Effective Candle-Power Seconds (also expressed as BCPS, Beam Candle-Power Seconds), specified in the flash unit instructions.

[3] For cameras with focal plane shutters. For other cameras any shutter speed up to 1/500 can be used.

NR-Use of such fast film with these flash units at 10 feet is not recommended.

A Guide to Floodlights and Spots

The chart opposite lists the five most common and useful types of floodlights. All can be used with any type of black-and-white film. When using them with color film, however, make sure that the color balance of the lights conforms to the color balance of the film; otherwise a conversion filter must be used on your camera.

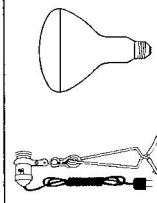
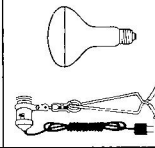
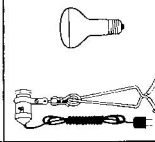
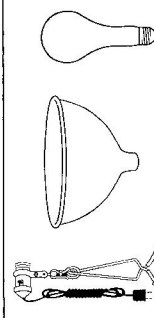
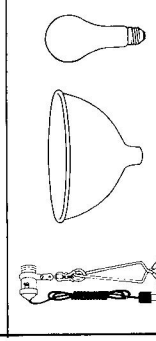
Mushroom-shaped floods are silvered to act as their own reflectors. They may be screwed into any household lamp socket or used with the fixture illustrated.

Bulb-shaped floods, also available in blue-tinted bulbs, are much less expensive but lack built-in reflecting surfaces and are most effective when used with auxiliary reflectors, as shown in the bottom two illustrations. Photographers who do a great deal of work with floods save money by purchasing reflectors and bulbs, replacing only the bulbs when they burn out.

Reflector spotlights are identical in shape with reflector floods, but come only in the 500-watt rating. They throw an intense, narrow beam to create strong highlights and shadows and are usually used along with floodlights.

Wattage indicates brightness of floodlights. The powerful 500-watt bulbs are generally the most useful; bulbs of lower wattage serve as auxiliary light sources, or several can be used in a small room instead of one or two 500-watt bulbs. The wattage also indicates how many lights can be used without risk of blown fuses or even fire. Each household circuit normally can carry a maximum of 15 amperes of current. To determine how many amperes are being drawn by your floods, divide the wattage of each flood by 110. A 500-watt bulb draws almost five amperes; three such lamps could ordinarily be used on one circuit, provided no other electrical device, such as a room light or radio, is used on that circuit.

Basic Types of Floodlights

Watts	Shape and Required Accessories	Color Balance	Use[1]
Floods with Built-in Reflectors			
500		3400K	For use with Type A color film and all black-and-white films; a spotlight of this same wattage, color balance and appearance is also made
		3200K	For use with Type B color film and all black-and-white films
375		3400K	For use with Type A color film and all black-and-white films
200		3400K	For use with Type A color film and all black-and-white films
Flood Bulbs Requiring Separate Reflectors			
500		3400K	For use with Type A color film and all black-and-white films
		3200K	For use with Type B color film and all black-and-white films
		Daylight	For use with all black-and-white films and to supplement daylight with all color negative films and daylight type color reversal films
250		3400K	For use with Type A color film and all black-and-white films
		3200K	For use with Type B color film and all black-and-white films
		Daylight	For use with all black-and-white films and to supplement daylight with all color negative films and daylight type color reversal films

[1] If the appropriate color-correcting filter is placed over the camera lens, any of these lights can be used with any color film.

Five Common Errors

By asking yourself a few questions before taking a picture you can usually avoid the mistakes that every photographer hides among his discards *(illustrations below and on the following pages).* Probably the greatest disappointment amateurs suffer is the so-so picture that results from a failure to emphasize the dominant element in a scene. But one's concentration can also be carried

Are you close enough?

The faces in this group are barely distinguishable because the photographer stood too far away.

What's in the background?

If he had looked beyond the girl, the photographer would have noticed the tree "growing" out of her head.

too far. Many photographers become so intent on their main subject that they forget about the background, and backgrounds are very often cluttered and distracting. (There's no telling how many otherwise good pictures have been spoiled by such odd effects as trees growing out of heads and rivers running through ears, as in the photograph at bottom left.) Unintentional blurring is also a common problem, resulting either from camera movement or from the photographer's failure to select a shutter speed fast enough to stop the motion of his subject. Purposeful blurring, however, either of the background or of the subject itself, can often be an effective method for creating the impression of speed—of fast-moving traffic, for example, or a runner or ski racer.

By moving in closer the photographer turned the same scene into a charming family portrait.

A better portrait is achieved by moving in and pointing the camera down to eliminate distracting detail.

Will vertical lines be distorted?

Vertical lines, like those of the tall buildings, will converge if the camera is pointed even slightly up.

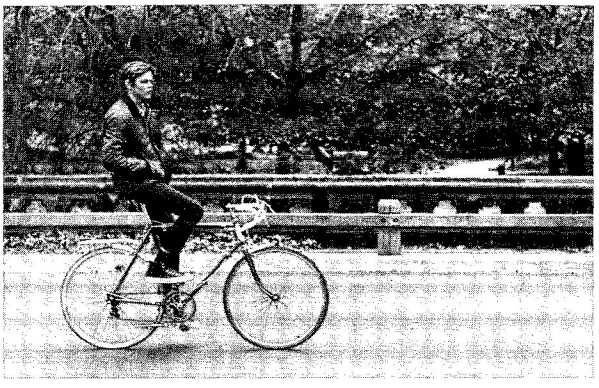
Is your shutter speed right?

The bicyclist is blurred because the photographer did not use a shutter speed high enough to freeze his motion.

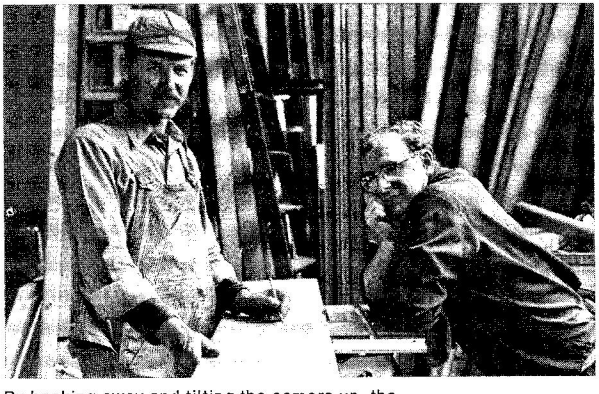
Have you checked the edges of your viewfinder?

The photographer was so intent on a close-up he chopped off the head of one of his subjects.

By bringing his camera level, the photographer corrected the distortion and got a better picture of the carriage.



A speed of 1/500 second stops action. Motion might have been suggested by "panning" to blur the background.



By backing away and tilting the camera up, the photographer included both men in his picture.

For Better Pictures

Bracket exposures. Although processing can rectify errors in exposure, it cannot compensate completely —some details and tonal shades are inevitably lost. Most professionals allow for errors when shooting by "bracketing." After making the shot at the exposure that seems correct, shoot an extra frame at one f-stop higher and another at one f-stop lower. If, for example, you shoot at f/4 with a shutter speed of 1/125, take one more shot at f/2.8 and one at f/5.6, using the same speed. This technique will help you bring off striking pictures that can be made in uncertain lighting. Often the most beautiful landscapes can be taken at dawn or twilight. But light changes rapidly at those times. Start by using the exposure recommended on page 19 (or take a meter reading); then bracket one or even two f-stops in each direction.

Moonlit landscapes are also charming—and tricky to photograph. Use a tripod, a long exposure,[1] and bracket your exposure lavishly. "When you're taking pictures by moonlight," warns LIFE photographer Bill Eppridge, "you never know exactly how much light there is. If you've been indoors, it looks dark out until your eyes become accustomed to the moonlight, after which it begins to appear very bright. Since most meters don't read light that low, you really have to bracket up and down the scale."

Close one eye. This is an old, simple trick that has often been lampooned, but it does help indicate how a scene will look in a photograph. To compose most pictures, you should see them in terms of two-dimensional forms—as if they were pen and ink drawings. Close one eye. Then make a rectangular frame by holding up your hands with the thumbs touching, and look at the scene through this frame with your other eye. Now you're seeing approx-

[1] If you're using color film, don't take exposures of longer than five seconds—unless you want your pictures to turn out purple.

imately what a camera lens sees—a special two-dimensional world in which forms and their placement become critically important.

Look for designs and patterns. The best photograph of New York City might be not a familiar shot of its skyline, but simply of a crack between two office buildings and a tier of windows. There's a vertical pattern to those shapes that may make a more dramatic statement about the vertical city than massed skyscrapers. Almost every scene has some pattern—the chimneys on houses, the shadows of people, the lines of furniture—that can add impact to a photograph. By consciously searching for such a design and emphasizing it in your composition, you can often make a striking picture of what seems to be a routine view.

Try silhouettes. At times an object is more meaningful in silhouette than when shown in full detail. To make a silhouette, gauge what the exposure would be for the brightly lit background and then close down one or two f-stops. If the background illumination indicates an exposure of f/8 at 1/250, shoot at f/11 or f/16 with the same shutter speed.

Shoot color in shaded light. "Many people cling to the notion that you have to have bright sunlight in order to shoot color," says Eliot Elisofon, "but often you'll get the softest and most beautiful colors on a day that's just slightly overcast." (One of Elisofon's most memorable pictures is a color shot of Japanese schoolchildren walking home under bright, rain-slicked umbrellas during a thundershower.)

Arthur Rickerby says, "If you're taking a portrait of someone wearing something brightly colored, you can photograph them in open shade." A nice effect can be had by selecting a shady spot with a bright background. Then throw the background out of focus, so that you get an abstraction of soft colors behind the subject. To do this, move in close to the subject and gauge exposure from the light on his face. Then adjust shutter speed so that you can shoot with a large f-stop like f/2 or f/2.8. You've done two things. By exposing for your subject, who is in the shade, you have made the background come out in the picture brighter than normal. And by using a large f-stop and thus decreasing depth of field, you

have thrown that same bright background out of focus.

Use the "wrong" color film. If you want to create an unusual effect, suggests Arthur Rickerby, try Type A or B color reversal film, normally used with artificial lighting, in lighting that technically calls for daylight film. The pictures will come out with an overall bluish cast—spectacular in dawn and twilight scenes.

Don't give up in dim light. When you can't or don't want to use flash or floodlights, Co Rentmeester suggests super-fast film. Rentmeester used such film recently when shooting a story on teenagers in the Far East. "Many of the pictures for this story were taken in bars or nightclubs, where flash would have entirely destroyed the atmosphere and inhibited these kids."

At other times, fast or medium-speed black-and-white films can be "pushed" by calculating exposure as if they had an ASA rating two or three times their actual speed and then asking a processing laboratory to develop the negatives to suit that ASA rating. Some color film manufacturers also offer a pushed processing service at extra cost. But for best results, films normally should *not* be pushed because pushing usually increases grain size and affects tones.

Pre-set the camera. Before you leave the house with your camera, set the shutter at 1/125. This way you don't have to fumble around trying to select both an f-stop and a shutter speed. Just pick your f-stop and shoot. If possible, make all camera adjustments—aperture, shutter and focus—before turning your camera toward the subject, particularly when photographing people. Usually you can focus on something that is to one side of the subject but at the same distance from the lens; in the same way, exposure can be gauged by pointing the light meter at another similar object. Many photographers carry their cameras with all the settings adjusted for average conditions so they can shoot immediately if they want to.

Check the shadows. Pictures of people often look best if their faces are shaded—but watch out for shadow patterns. The alternating areas of light and dark produced by tree leaves, trellises and blinds make very attractive designs in the background of a picture, but they can be distracting if they fall across a person's face or even across his clothing.

2 Developing and Printing

Advantages of Home Processing

One obvious reason for setting up a darkroom in your home to develop and print your own pictures is economy —an 8 x 10 enlargement that costs a dollar or more if it is produced by a commercial processing laboratory requires only a few cents' worth of materials when it is done at home.

But the compelling reason is the control that you gain over results. You can adjust film development processes to suit the specific conditions under which pictures were taken—you might even decide to sacrifice most of a roll to bring out two or three frames you especially want but know were over- or underexposed. You can develop for minimum grain or for a purposely grainy effect. And when you print your negatives, you gain even greater control: You can crop the edges of the picture area exactly as you want—in effect composing a picture after it has been shot; you can convert a small part of a negative into an entire picture, alter contrast between tones, and lighten or darken specific areas of each print to bring out details that otherwise would be lost.

The term "darkroom" can be misleading. Only during one 10-minute operation, when the film is being removed from the camera and placed into a developing tank, is total darkness required. (If even a bit of light enters the working area during this operation, the film may be fogged.) But most of the time the amateur who processes film and makes his own prints will be working under normal room illumination or under a dim, colored, photographic "safe light" that will not affect photographic materials under ordinary circumstances.

The following pages contain basic, practical information on darkroom equipment, on how to set up a temporary darkroom and on the step-by-step processing of film and enlargements. The discussion is limited to black-and-white film, since color processing is fairly complex and most amateurs (and professionals) leave it to commercial laboratories.

A Basic Darkroom

Most items that are essential to an amateur darkroom are not expensive, as the list on the opposite page shows. The total cost of trays, a photographic thermometer, tongs, chemicals and other small items is around $25. The most expensive item on the list is the enlarger. There is no substitute for one, unless the beginner decides to start with film developing and to forgo print making until later. (Others may wish only to make enlargements from negatives developed by a lab. For this reason, each item on the list has been keyed to its darkroom functions.) Enlargers sell at all prices from $20 to $1,000. Though most low-cost enlargers, such as the one that is priced at less than $40 in the list on the opposite page, will accept only 35mm and 126 negatives, they will make sharp prints if they are properly used. More expensive enlargers will generally accept a wider range of film sizes, are more solidly built and have a sharper lens, some having interchangeable lenses for different purposes. On the whole, experienced amateurs feel it is wise to buy a good enlarger and economize on other equipment if it is necessary.

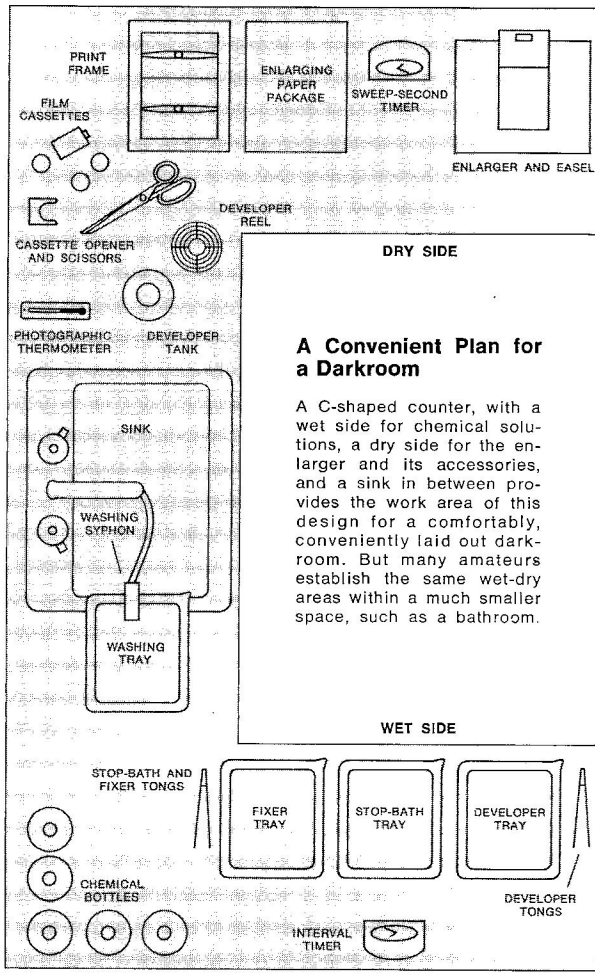
You can find substitutes for some of this equipment. Opaque detergent bottles, after being washed out thoroughly, can be used to store chemicals. The top can be cut from another detergent bottle and used as a funnel. A soda-bottle opener can be used to open cassettes instead of the special tool listed.

The thrifty amateur can also get by without some of the more costly equipment. The tray syphon is a convenience —it agitates and changes the water during the washing of prints—but a running faucet will be just as effective if you change all the water in the tray four or five times. By using a household electric clock, you can manage without buying special timers, although an interval timer is desirable because it warns you audibly when it is time to transfer the film or prints from one solution to another. Even a printing frame is not absolutely essential. Some

Basic Equipment for a Darkroom

Developing	Contact Printing	Enlarging		Approximate Retail Price
●			Film cassette opener	$ 3.00
●	●	●	Photographic thermometer	3.00
●	●	●	1-quart graduate (for measuring liquids)	2.00
●	●	●	Five 1-quart dark opaque plastic bottles for film developer, paper developer, stop bath, fixer and replenisher	4.25
			Photographic chemicals:	
●			Film developer (1 quart)	.50
	●	●	Paper developer (1 quart)	.50
●	●	●	Stop bath (16 oz.)	.70
●	●	●	Fixer (1 quart)	.40
	●	●	Tray syphon	9.00
	●	●	Two pairs of print tongs (plastic or stainless steel)	1.50
●	●	●	Plastic or glass funnel	1.25
●			Interval timer	15.00
	●	●	Sweep-second timer	15.00
●			Stainless steel developing tank	6.00
●			Stainless steel developing reel	5.00
	●	●	Four 11 x 14 trays	7.50
	●	●	11″ blotting roll	9.50
●			Pair film clips for hanging film up to dry	.75
	●	●	Anti-static cloth for dusting negatives	1.35
●			Squeegee	3.00
	●	●	Viscose sponge	.50
	●	●	Enlarging paper: 8 x 10 single weight, 25-sheet package	3.25
	●		8 x 10 contact printing frame	6.00
		●	Enlarger	40.00
				$138.95

Other items you will need, such as paper towels, scissors and a plastic bucket for waste materials, are normally found in the house and have not been included in this basic list.



A Convenient Plan for a Darkroom

A C-shaped counter, with a wet side for chemical solutions, a dry side for the enlarger and its accessories, and a sink in between provides the work area of this design for a comfortably, conveniently laid out darkroom. But many amateurs establish the same wet-dry areas within a much smaller space, such as a bathroom.

amateurs simply cover the negatives and photographic paper with a pane of glass.

Running water is a great convenience in a darkroom. That means, in most homes, you need a location in or near a bathroom, kitchen or laundry (a basement laundry is particularly advantageous because it is also easy to light-proof). A permanent installation, set aside for darkroom use, is a luxury few amateurs start with; they usually keep their equipment in a closet *(page 64)* and set it up near a sink when the room can be pre-empted for processing. The main problem with such expedients

(aside from family interference) is light-proofing. Ordinary shades and curtains may not block enough window light to permit processing during daytime hours, and until you are certain that light coming in from outdoors will not spoil your pictures it is advisable to make enlargements at night. Film can be developed in ordinary light once it has been loaded into the developing tank in total darkness, and that operation can be carried out safely in a tightly closed closet even in daytime (you may have to stuff a towel into the crack at the bottom of the door to block light leakage there).

A planned layout saves time by giving you a clear idea of exactly what items you will use and precisely where they will be placed so you can put your hands on them easily in dim light or darkness. The darkroom diagramed at left shows a typical setup, divided into dry and wet areas around a sink or washbasin. The dry area should be near an electric outlet, so that the enlarger's cord cannot slip into a tray containing liquids and possibly cause a short circuit. The colored "safelight," which provides illumination when the room lights are turned off during certain operations should be installed about three feet above the working area. The handiest safelights are those that can be clamped onto a shelf, a closet door or a towel rack and moved around depending on the work to be done.

Darkroom chemicals should be handled with the care given all active compounds. They are no more dangerous than many other chemicals used around the home, but they can cause harm if commonsense precautions are ignored. Developers are caustic—like strong soap—while most stop-baths and fixers contain acetic acid (the acid of vinegar); in addition, many photographic chemicals contain poisonous substances. If the darkroom is set up in the kitchen, all food should be removed from the immediate working area so that there is no chance of contamination. Darkroom chemicals should be kept out of reach of children at all times. If spilled they should be wiped up at once with a wet sponge or paper towel, as they may leave permanent stains on carpets, walls and floors. It is wise to wash your hands if chemicals get on them, as they may cause irritation or skin rash. Keep a supply of paper towels nearby for drying your hands and wiping up water and chemicals.

Developing Film Step by Step

Developing film is very simple if you remember one thing: Be careful. Cleanliness is essential, for even very small amounts of dust make spots on the negative that become large blemishes in enlargements. To avoid them, mop the floor and work surface frequently and keep your fingers off the surface of the film, always holding it by its edges. Care is also necessary in observing the chemical manufacturer's specifications for solution measurement, temperature and development time. But if these precautions are followed, the rest of the procedure is routine, involving four main steps:

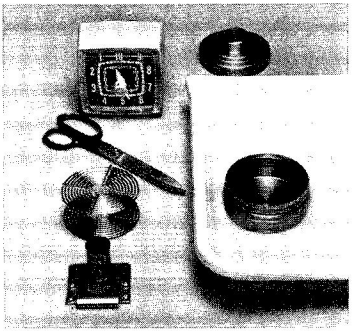
1. Take the roll of exposed film out of the camera and remove it from its container or paper backing.
2. Thread the film into the spiraling grooves of a developing reel.
3. Place the reel of film in a tank, in which it stays for processing and washing.
4. Hang the film up to dry.

The details of these steps are shown in the pictures on the following pages. Most can be carried out in a normally illuminated room, but the film must be loaded on the developing reel and placed in the tank in total darkness. This demands some dexterity, for a 35mm roll is five and a half feet of springy plastic ribbon just waiting to unwind into an infuriating, dust-collecting tangle. However, a little practice—eyes shut—with an uncut roll of unwanted negatives (or better, a junked undeveloped roll) quickly develops the necessary skill.

The step-by-step pictures show the development of 35mm film, but the same techniques apply to all roll films. There is a difference in the way the various films are prepared for processing. The roll of 35mm film comes in a cassette that must be pried open, the 126 film used in instant-loading cameras in a plastic cartridge that is twisted apart and other films—such as 127, 120 and 620—are simply wound on their spools with a protective paper backing that is removed.

○ Room lights on

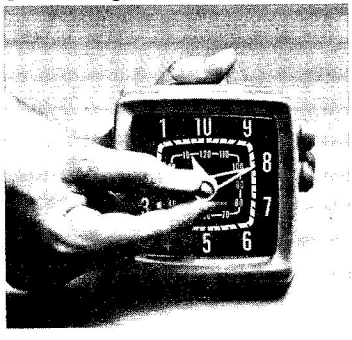
1. Bring the three chemical solutions—developer, stop bath and fixer—to the required temperature, usually 68°F. After mixing each according to the manufacturer's instructions, place the bottles in a pan containing water that covers at least 50 per cent of the bottle. Add hot or cold water to the pan until the thermometer shows 68°.



2. Lay out your equipment neatly, so that you can find it easily in the dark. Counterclockwise, this equipment consists of a timer, scissors, developing reel, film cassette opener (a soda-bottle opener will serve) a tray containing water at 68°F., the developing tank and cover.

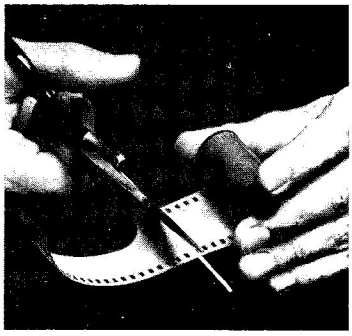
3. Pour the developer into the developing tank to fill it nearly full. Do not place the cover on the tank at this time and do not remove the tank from its tray of water.

● Room lights out

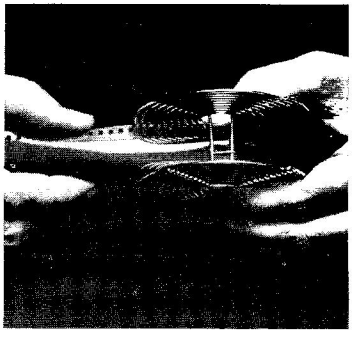


4. Set the timer for the developing time specified by the developer manufacturer, but do not start the timer yet. NOW TURN OFF THE ROOM LIGHTS. With the film cassette opener pry the end off the cassette—or in the case of 127, 120 or 220 film, tear open the seal.

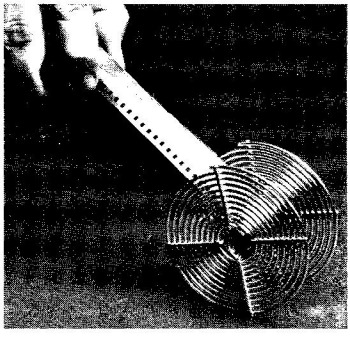
5. With 35mm film, cut off a narrow section of film to make a square end. With roll film other than 35mm, follow the instructions supplied with your developing tank.



6. Start the film into the developing reel. Pinch the film slightly by grasping the edges between your thumb and forefinger, then slide the end of the film into the clip that holds it in place. Since this and the following step must be performed in total darkness, practice first with your eyes shut, using a roll of junked film.

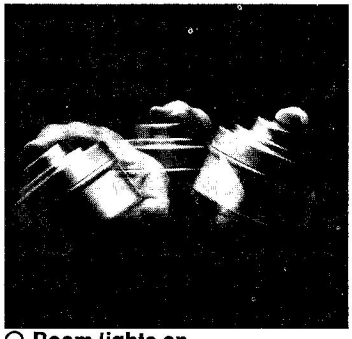


7. Thread the film into the grooves of the reel. To do this, place the reel edgewise on a flat surface, then push the film so that the reel begins rolling forward and the film winds naturally around the core. The film must be evenly threaded; if one layer touches another, the touching points will not develop properly.



8. Place the reel, loaded with film, in the developing tank and simultaneously start the timer. Push the reel up and down with your finger for five seconds to dislodge air bubbles. Air bubbles remaining in the liquid may leave undeveloped spots on your film.

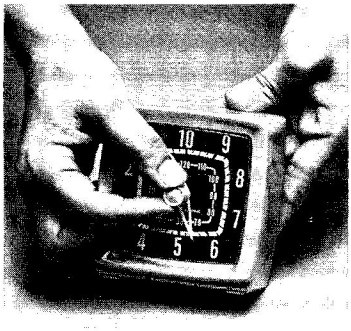
9. Put the cover on the developing tank. At this stage the light may be turned on, since the tank's cover makes it light tight; however, careful darkroom workers pick up the tank and agitate it immediately after putting the cover on—before pausing to turn on the light.



10. Agitate the tank. This multiple-exposure photograph shows the agitating technique used by most professionals. Gently swing the tank back and forth to a 45° angle from the vertical. Agitate for fifteen seconds, once each minute, during the total developing time. When the timer signals the end of the developing period, pour the developer out. DO NOT REMOVE THE TANK COVER.

○ **Room lights on**

11. Pour the stop bath into the hole in the center of the tank cover, *without removing the cover.* Fill to overflowing. Pick up the tank and agitate it again with the same technique described in step 10, for about 60 seconds. Then discard the stop bath, again without removing the cover.

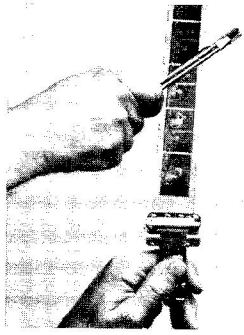


12. Set the timer for 5 to 10 minutes, following the chemical manufacturers' recommendation for fixing time.

13. Pour the fixer into the hole in the tank cover, leaving the cover on. Fill to overflowing. Pick up the tank and again agitate it, using the technique described in step 10. Agitate for 15 seconds, once each minute. When the timer signals the end of the fixing period, pour the fixer back into its bottle. Now the cover can be removed from the tank.

14. Put the tank in a sink and in it place a rubber hose connected to a faucet. Run water, adjusted to a temperature of 68°F., through the tank for 30 minutes. Then pick up the tank and pour out the water. (To assure even drying, many photographers follow the washing by bathing the film for three minutes in a wetting agent available at photo supply stores.)

15. To remove excess water from the film surface, draw the film taut and gently draw a soft kitchen sponge or the rubber surface of a windshield wiper, at a 45° angle down the length of the film. Do this once on each side of the film, making sure no droplets of water remain. The film should be hung by a clip —away from the room wall or dust may get on it.



16. Mark the number of rolls developed on labels affixed to the bottles of stop bath, fixer and—if a replenishable type is used —developer. Only by keeping careful track of usage can you be sure to replace or replenish chemicals as needed to keep solutions always at full strength.

Tips on Development

Mix developer solution gently. If you shake it too hard or stir it very vigorously, a large amount of air enters the solution; the air reacts with the chemicals and reduces their effectiveness. If you are using a powdered developer and some powder refuses to dissolve, strain it out, mix it with a little hot water to dissolve it and then pour it back into the solution.

Keep equipment within reach. To avoid groping in the dark, place things you need while lights are off—developing tank, reel and rolls of exposed film—in a shallow cardboard box on top of your work surface. Then even film cassettes cannot roll away.

Avoid contaminating solutions. If you spill fixer into the developer, you may ruin the negatives being processed. A few drops of developer dripped into fixer are not disastrous, but the more the fixer is contaminated the sooner it will be exhausted. Any of these chemicals may irritate the skin and they should be washed off hands promptly; use paper towels for drying, since cloth ones may be stained.

Agitate the tank regularly. Every 30 seconds or so, rock or swish the developer tank to bring fresh solution into contact with the film; otherwise the negatives may come out streaked. But go about it gently; over-agitation may produce the air bubbles that cause spots.

Remove paper backing first. If you are using paper-backed film (127, 120 or 620), separate the film and paper entirely before starting to thread the film onto the developer reel. The easiest way to do this is to unroll the spool until you have unwound enough paper to reach the film. Let the film roll up as you continue unwinding the paper; when you reach the other end of the film, pull it free of the paper—then you will have a roll of film alone, minus paper, ready to be threaded for development. Do not unroll the spool too rapidly or your film is liable to be marred by static electricity.

Handle film by the edges only. If you touch the surface, oils from the skin may be left there to cause uneven development or to pick up dust.

A Guide to Developers

Most photographers use one type of developer for film and another for printing paper, but universal developers that will process both are available. The choice of a paper developer influences the warmth of tones of black produced in the print. The choice of film developer depends partly on the fineness of grain required in the negative and partly on how much the negative must be "pushed" in development to make up for underexposure when the picture was shot. The "fast" developers that push underexposed negatives generally produce coarser grain. Many film developers are re-usable or replenishable, but the "one-shots" are intended to be thrown away after each use.

Universal Developers (Suitable for Paper and Film)

Manufacturer and Brand	Re-usable	Replenishable	Powder	Liquid	Liquid Concentrate
CLAYTON P-20					●
DUPONT 53-D	●		●		
ILFORD PQ/Universal					●
KODAK Dekol Tri-Chem Pack	●		●		
GAF Vividol			●		

Paper Developers[1]

Manufacturer and Brand	Warm Tone	Neutral Tone	Cold Tone	Powder	Liquid	Liquid Concentrate
ACUFINE Printofine			●	●		
AGFA Metinol		●		●		
ETHOL LPD	●	●	●	●		●
FR Paper Developer			●			●
GAF Ardol	●			●		
GAF Miradol	●			●		
KODAK Dektol			●	●		
KODAK Selectol	●			●		

Film Developers

Manufacturer and Brand	Re-usable	Replenishable	Powder	Liquid	Liquid Concentrate	
ETHOL Ethol TEC	●		●	●		For Moderate Grain Negatives — Normally Exposed
FR One Shot FR-X-22 (Kit)					●	
FR One Shot X-44					●	
FR FR-X-100	●	●			●	
GAF Isodol		●	●	●		
ILFORD ID-11	●	●	●			
KODAK D-76	●	●	●			
KODAK DK-50	●	●		●		
KODAK HC-110	●	●			●	
TOWNLEY Monobath TC-1	●				●	
AGFA Rodinal					●	For Moderate Grain Negatives — Underexposed
DUPONT 16-D Film Developer	●	●	●			
TOWNLEY Monobath TC-2	●				●	
EDWAL Minicol II				●		For Fine Grain Negatives — Normally Exposed
EDWAL Super 20		●		●		
ILFORD Microphen	●	●	●			
KODAK Microdol-X	●	●	●			
AGFA Atomal			●			For Fine Grain Negatives — Underexposed
CLAYTON P-60		●			●	
EDWAL Super 12	●	●		●		
ACUFINE Autofine	●	●	●			For Ultra Fine Grain Negatives — Normally Exposed
ACUFINE Diafine	●	●	●			
FR FR-X-33C	●	●			●	
ACUFINE Acufine	●	●	●			For Ultra Fine Grain Negatives — Underexposed
ACUFINE ACU-1			●			
ETHOL Ethol Blue					●	
ETHOL Ethol 90	●	●	●	●		
ETHOL Ethol UFG	●	●	●	●		
GAF Hyfinol		●	●			

[1] It is not advisable to re-use paper developers.

Making Contact Prints Step by Step

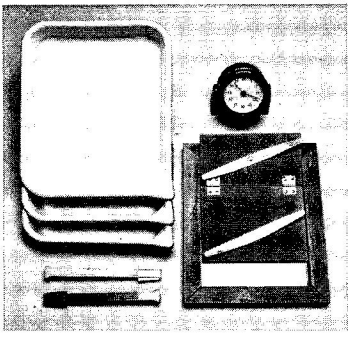
You get the most out of the convenience and economy of small-size film—particularly 35mm film—if, before preparing enlargements, you make a contact sheet: an actual-size print of all the negatives on a roll side by side on a single sheet of photographic paper. Close study of these small, inexpensive pictures can indicate which of several similar negatives to use for enlargement, how much of the negative area to include, even how to vary enlarging procedures to suit the negative's qualities. That way the photographer can take advantage of a great many shots of a subject without the trouble and expense of enlarging all of them.

Some amateurs skip the contact printing step and proceed directly from negative to enlargement. However, it is very difficult to judge the quality of a photograph from a tiny negative, much less to decide how to adjust enlarging operations for minor variations in exposure or lighting. The effort of making the contact sheet is usually more than repaid by savings on enlargements.

The only special equipment needed for making contact sheets is a printing frame *(page 39)*. (A piece of glass about 10 x 12 inches may be used in place of the printing frame.) It holds a sheet of sensitized paper in contact with strips of negatives cut from the roll; after light shines through the negatives to expose the paper, the paper is developed to reveal the positive prints. Any light source —a desk lamp, for instance—will do so long as it illuminates all the negatives evenly, at a 90° angle. Most convenient, however, is the light beam of the enlarger, which guarantees even, 90° illumination.

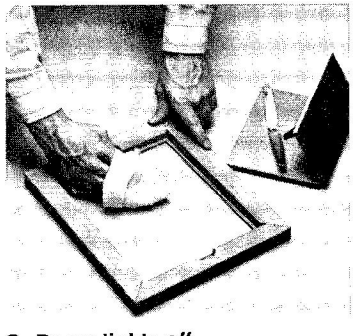
Once the paper has been exposed, it must be processed in chemicals like those used to develop film: a developer, stop bath to curtail the development process and fixer to remove unused light-sensitive particles from the emulsion. It is advisable to use either a so-called universal developer or one compounded for printing papers to process contact prints and enlargements.

○ Room lights on



1. Assemble the equipment: three 11 x 14 trays (the same ones used for enlargements), two tongs (one for use in developer, one for stop bath and fixer), an 8 x 10 printing frame and a sweep-second timer. The frame is made like a picture frame but has a hinged, clamp-in back to simplify loading and unloading. A fourth tray may be needed later for washing.

2. Pour developer into the left-hand tray, stop bath into the center tray and fixer into the right-hand tray, each to a depth of about an inch. The standardized left-to-right order helps prevent mistakes —all three liquids look alike. Make sure solution temperatures are within the ranges recommended by the manufacturer; if not, warm or cool the bottles in a water bath as shown in step 1, page 43.

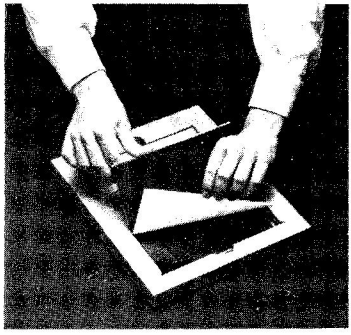


3. Wipe the printing frame's glass with a dry, lintless cloth to remove dust. Occasional washing may be needed, but use water only —household window cleaner may leave a chemical residue that can harm negatives. TURN OFF THE ROOM LIGHTS. TURN ON THE SAFELIGHT.

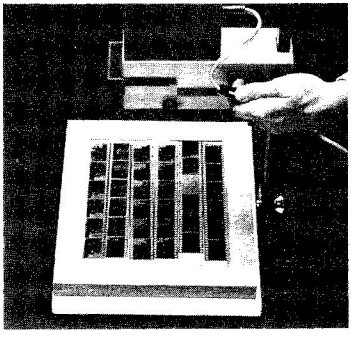
● Room lights off

4. Lay the negatives, cut into strips of six pictures each, side by side on the glass surface of the printing frame. Be careful to place the strips with the emulsion-coated side up (its dull sheen is easily distinguished from the glassy shine of the back), so that it will be in direct contact with the emulsion side of the paper. Otherwise the prints will not be entirely sharp and will also be reversed, like mirror images.

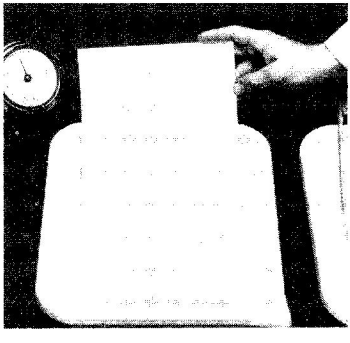
5. Place the printing paper on top of the negatives in the frame. Close the package. The paper's emulsion-coated side (in this case the shiny side) must be down. Handle the paper only by its edges or fingerprints may show in the print. Lock the back into the printing frame.



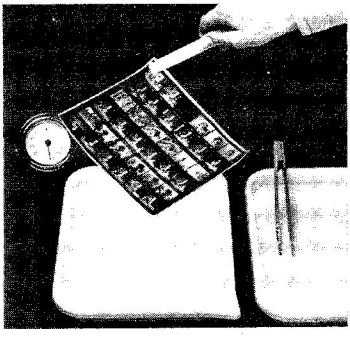
6. Turn the frame over and switch on a bright white light above it to expose the print. Most photographers use the light from their enlargers. Simply put the frame on the enlarger easel and turn on the lamp. With an enlarger of the type listed on page 39 and No. 2 grade enlarging paper *(pages 62-63)*, the exposure for average negatives is about 15 seconds with the lens set at f/11.

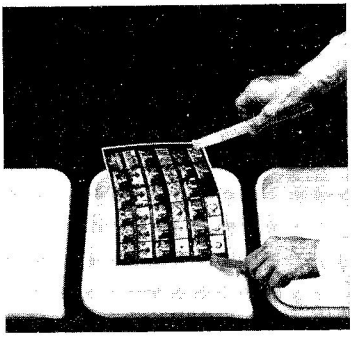


7. Holding the exposed paper by one corner between the thumb and fingers of one hand, slide the sheet into the developer tray in one swift, continuous movement. This technique keeps fingerprints off the paper and immerses the entire surface in developer quickly. If any part of the sheet remains above the liquid surface, immediately poke it under with the developer tongs.

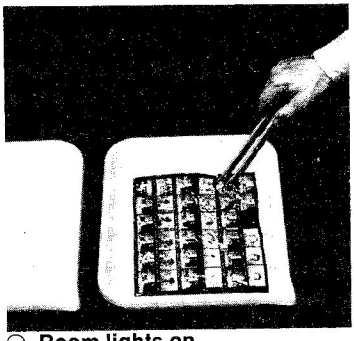


8. Using the developer tongs, lift the paper above the tray by one corner, about halfway through the developing period recommended by the chemical manufacturer (generally one to two minutes), and examine the pictures. If dark areas are a rich black, let excess developer drip off and proceed to step 9; otherwise continue developing the print. Don't stop too soon.



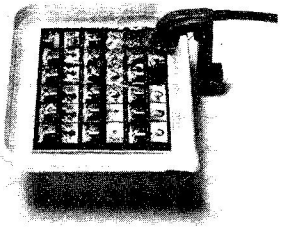


9. Holding the fully developed print above the stop bath with the developer tongs, use the other tongs to pull the paper into the liquid. (During this transfer operation, the developer tongs must not touch the stop bath, or the developer will be contaminated.) The print need remain in the stop bath for only 15 to 30 seconds (follow the manufacturer's instructions).

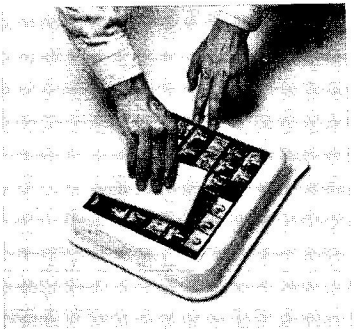


○ **Room lights on**

10. Using the stop-and-fixer tongs, transfer the contact sheet to the fixer tray, making certain it is fully submerged. After at least one minute, the lights can be turned on. The contact sheet should remain in the fixer 5 to 10 minutes (again, follow the manufacturer's instructions closely, for either under- or over-fixing can result in discolored prints). During this time, move the print around occasionally.



11. Transfer the print from the fixer into a tray of running water in a sink. A siphon like the one shown at left keeps water circulating continuously through the tray, but a stream of water running through a hose will serve if you swish prints around and rotate their order occasionally. Continue washing and agitating for at least one hour.



12. Wipe excess water from both the front and rear surfaces of the washed contact sheet, using a viscose kitchen sponge or a squeegee. You can do this conveniently by laying the print on the back of a clean tray. Dry the sheet by placing it in a photographic blotter book or blotter roll.

Tips on Making Contact Prints

Start with No. 2 grade paper. This is the grade suited to negatives containing an average range of tones of gray. A carefully made print on No. 2 paper will indicate the tonal range of each negative and suggest whether enlargements from the negative should be made on grades of paper that give more contrast between tones or less. (A chart listing papers and their characteristics appears on pages 62 and 63 of this handbook.)

Gain experience with trials. Start out by setting the enlarger lens aperture to a medium f-stop, such as f/8. Then take No. 2 grade enlarging paper and, using the technique described on pages 58 to 60, make a test sheet to show the effect of various exposure times. Since the finished test sheet includes many negatives made under a variety of conditions, no one printing exposure is likely to be correct for all the pictures and some will come out darker than others. Judge the exposure to use for the final print either from the most important picture or from those that seem to be average. Reset the aperture if necessary to give correct exposure within a convenient time: 30 seconds at f/8, for example, will give the same exposure as 60 seconds at f/11 or 15 seconds at f/5.6.

Keep records of exposures. Since a contact sheet can serve as a guide to the exposure needed for an enlargement, you will save effort later if you routinely note the exposure time and f-stop used. Simply write the data in pencil (ballpoint ink may wash off) on the back before you develop the print.

Identify pictures by frame number. Alongside each frame of 35mm film is a number that shows clearly in the contact sheet. It is wise to rely on this number to identify the negative corresponding to the picture you have selected in the contact sheet. Otherwise you may inadvertently use the wrong negative—pictures almost identical in negative form can look quite different in printed form.

Save the contact sheets. In 8 x 10 size they are easy to file and show you immediately all the pictures in a roll. Selecting pictures from a filed contact sheet instead of from an envelope of negatives minimizes handling of negatives—and avoids possible damage.

How to Use Contact Prints

Some amateur photographers mistakenly assume that if a print on a contact sheet looks too pale or too dark, a good enlargement cannot be made. But a contact sheet usually contains a number of pictures taken at different shutter speeds and f-stops all printed together, and it is most unusual for all the pictures to come out uniform. If there is a clear image, errors in exposure can usually be compensated for during the enlarging and developing processes. On the other hand, a picture that looks good on the contact sheet may be totally unsuitable for enlargement because of a blurry image that is not apparent on the tiny print. For this reason, 126 cartridge size, 35mm and 2 1/4 x 2 1/4 contact prints should always be examined with a magnifying glass.

A pale print on the contact sheet indicates that this negative is "dense"—it is more fully exposed than the others printed with it because the photographer had bracketed his exposures. However, a good enlargement can be made with a longer than usual enlarging exposure, using grade No. 3 or No. 4 paper to accentuate the contrast between shades of gray.

The baby's head is blurred but this is not apparent on casual inspection. Only by examining contact sheets with a magnifying glass can the photographer be sure that a negative is sharp enough for enlarging. Fuzziness, unlike exposure errors, cannot be rectified in the darkroom.

The distracting foreground in this contact print is marked for "cropping"—it will be eliminated from the print. When the negative is projected, the easel will be adjusted so that only the area inside the dashed lines falls on the printing paper. Cropping with a crayon on a contact proof is easier than trying to select the desired picture area while the negative is in the enlarger.

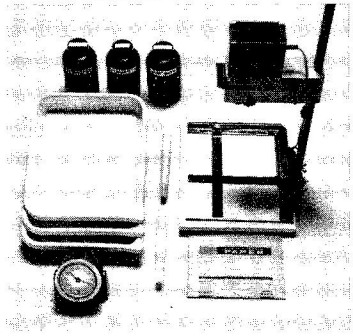
Making Enlargements Step by Step

Good black-and-white pictures are usually made less in the camera than with an enlarger. For it is when a small negative is being transformed into a large print that its best points can be made the most of: A detail almost lost in the negative—one face in a group, for example—can be made the center of interest by judicious selection of the portion of the picture to be enlarged. Similarly, unwanted details—the edge of a building, a utility pole—can be eliminated from the edges by leaving them out of the portion enlarged. The range of tones can be balanced so that white areas come out clear and bright while dark areas are a rich black by the appropriate choice of sensitized paper and processing technique. It is even possible to compensate for a lack of uniform lighting in the original scene by varying the enlarging exposure is given to particular areas of the picture.

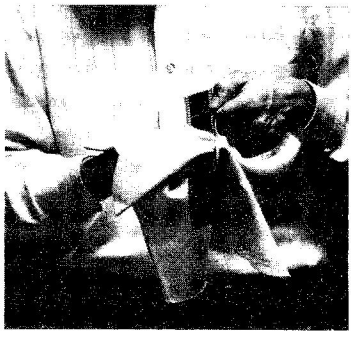
The enlarger is made like a slide projector on a vertical stand. It has a lamp in a housing with a condenser lens to concentrate light on the negative, which is held in an open metal frame that slides into a slot behind the main lens. This entire unit rides up and down on a post to change the size of the image projected at the foot of the enlarger. There an easel (either part of the enlarger or a separate item) holds the sheet of sensitized paper by its edges with adjustable metal masking strips (they shield enough of the paper from light to provide white borders for the print).

The enlarger must be matched to film size. Most amateur enlargers are designed for 35mm film, and they can enlarge one frame to 8 x 10, the size most popular for framing and display. (Those that also accept 2¼ x 2¼ negatives can enlarge them to a proportionately greater size.) Some can be adapted for even larger blowups—which are necessary to make an 8 x 10 print from a part of one frame—but a 35mm negative that has been enlarged to 8 x 10 has already been magnified about 8 times its original size.

○ **Room lights on**



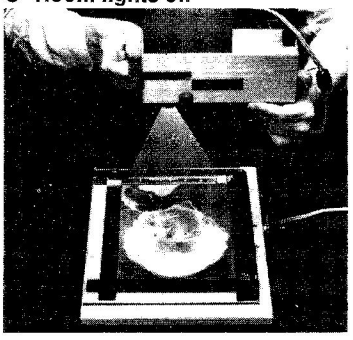
1. Assemble the equipment: bottles of developer, stop bath, and fixer, three 11 x 14 trays (another will be needed later for washing), sweep-second timer, two sets of tongs (one to be used in the developer tray, one for stop bath and fixer), a package of enlarging paper and an enlarger. Bring the solutions to 68°F., immersing the bottles in a water bath *(step 1, page 43)*. Then fill each tray about an inch deep: developer at left, stop bath center, fixer at right.



2. Clean the negative to be enlarged very gently with a soft camel-hair brush or one of the anti-static cloths sold for this purpose. Inspect the negative closely for dust. If you find any specks re-clean —unless removed they will be magnified into large white blotches in the print.

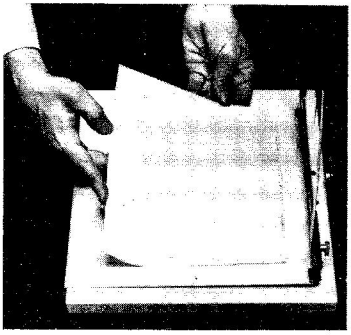
3. Insert the negative into the hinged metal carrier, being careful to touch only the edges of the film, and slide the carrier into the enlarger. Set the lens aperture wide open.

● **Room lights off**

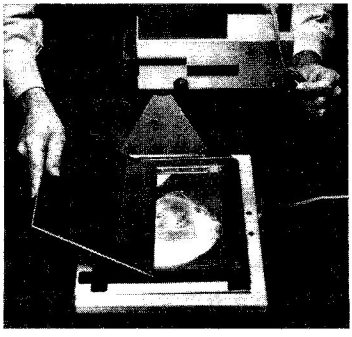


4. Turn on the enlarger to project the negative onto the enlarging easel, which should be set to the print size by moving the masking strips. Raise or lower the enlarger to change magnification, meanwhile moving the easel to include only the desired section of the negative. Focus for sharpness and set the lens to f/8 or f/11 (use one routinely to standardize on exposures). Then turn off the enlarger.

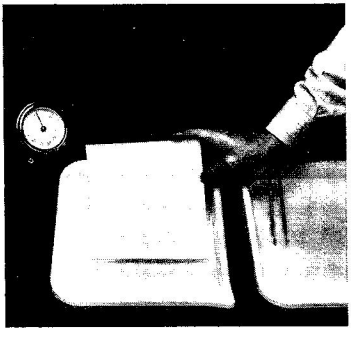
5. Place a sheet of enlarging paper on the easel, holding the paper by the edges and sliding it under the metal masking strips, which flip up to accept the paper. Lower the masking strips and see that they are set to grip the paper edges and give proper borders. MAKE SURE THAT YOU HAVE CLOSED THE PACKAGE OF ENLARGING PAPER BEFORE MOVING ON TO STEP 6.



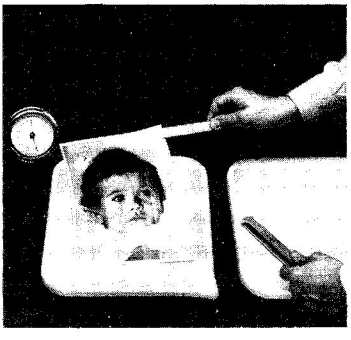
6. Cover the sheet of enlarging paper with cardboard to make a test print. Turn on the enlarger and slide the cardboard to expose two inches of enlarging paper. Ten seconds later slide the cardboard to expose another two inches; repeat this action until all sections of paper have been exposed, each for a different length of time. Then turn off the enlarger.

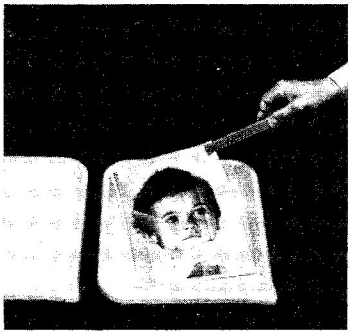


7. Slide the test print into the developer in one smooth but rapid motion *(page 52)*, giving a final thrust to the paper with your hand so that the development process starts almost simultaneously from the bottom to the top of the exposed printing paper.



8. Develop the print until the darkest areas are deep black (one to one and a half minutes). Using developer tongs, lift the print and let excess developer drain back into the tray. Then transfer the print into stop bath, using the stop-and-fixer tongs to pull it into the stop bath. The developer tongs must not touch the stop bath.





9. Using the stop-and-fixer tongs, transfer the print into the fixer. When the test print has been in the fixer for 30 seconds, TURN ON the light and choose the section of the test print that seems to provide the best overall reproduction of its part of the picture. Make a mental note of the exposures used for that section and TURN OFF the lights.

10. With a fresh sheet of paper on the easel *(step 5)*, expose the paper for the same time as the best section in the test print. Then process the print in developer, stop bath and fixer, following the method described in steps 7, 8 and 9. The print should remain in the fixer for 5 to 10 minutes. Gently agitate the print with your second set of tongs once a minute.

○ **Room lights on**

11. Wash the print for one hour (two hours if it was made on double-weight paper), in running water. If you are washing several prints at once, gently rotate them every five minutes or so to remove fixer as completely as possible and to prevent them from sticking together. Do not attempt to hurry the washing; it must be done thoroughly to prevent later discoloration of the prints.

12. After sponging away excess water, insert the enlargement, image side up, in a photographic blotting roll (or a book of photographic blotting paper) to dry. The blotting roll should be stood on end during the drying period, which takes several hours.

Tips on Enlarging

Judge the grade of paper to use from the test print. If all its sections seem greyish, use a high contrast paper —Grade No. 4 or No. 5. If the black areas are solid and lacking detail while the light areas are very pale and blank, try a low contrast paper—No. 1 or even No. 0. When in doubt use No. 2; it or No. 3 produces good prints from most negatives.

Make a test strip cut from a sheet rather than a full-sized test print in order to save on paper. Its smaller sections will usually reveal enough about the negative to gauge exposure time needed.

Make sure the negative fits correctly into the carrier, so that no white light leaks around through empty spaces. Such stray light can spoil the enlargement.

Standardize on one enlarger aperture setting, and try to use it routinely for all your enlargements. This way the only variable in exposure will be the time that the enlarger light is left on, and there will be no need for complicated mental calculations when applying test-print results. Record keeping is also simplified. Most technicians use f/8 or f/11 for the enlarger f-stop (f/8 will require an exposure of 10 to 20 seconds for the average print). However, you may want to depart from the standard setting and use a smaller aperture in special cases when a negative requires extensive dodging or burning-in; these are most conveniently performed if the exposure time is fairly long.

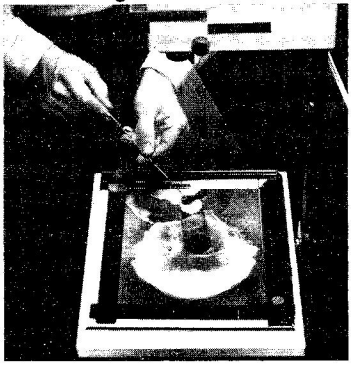
To darken a section of an enlargement while it is being developed, lift the print out of the developer for a moment with developer tongs, place it face upwards in the palm of your hand and breathe on the area of the print that needs strengthening. The warmth of your breath will accelerate the chemical action of the developer on that area. This technique can supplement the dodging method described on the opposite page.

To straighten out a badly curled print, grasp it by opposite corners and gently slide the back of the print over the edge of a desk or table. Be sure to hold the print by its corners or you may crack the emulsion.

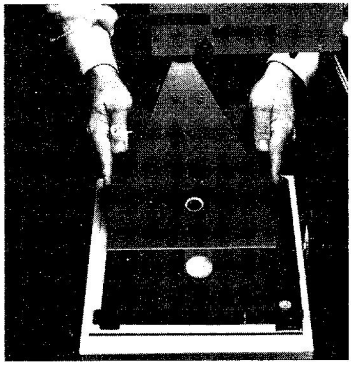
"Dodging" and "Burning-in" Techniques

Dodging and burning-in are two methods of giving different exposures to different parts of an enlargement, varying the exposure times to suit each area's requirements. If part of an enlargement comes out too dark, dodging is called for. That area of the picture is simply shadowed—with the fingers or a piece of cardboard —during part of the whole exposure. Burning-in is the opposite, used when part of a picture prints too light. After the entire negative has received an exposure sufficient for most areas, a piece of cardboard with a hole in the middle is used to block the light from most of the enlarging paper while permitting light to reach the part that needs extra exposure. With both techniques, the cardboard (or fingers) should be kept in constant motion to blend the affected area into the rest of the print. Stop down the enlarging lens so that total exposure time is increased, allowing time for the dodging or burning-in.

● **Room lights off**



Using a piece of cardboard as a tool, a darkroom technician holds it between the projected image and the lens to "dodge," that is, cover an area, limiting its exposure, because it would print too dark if it received the same amount of exposure as the rest of the print.



A large piece of cardboard with a hole in it is used as a tool to "burn in," that is, increase exposure of a selected area. The board blocks the light except over the selected area where extra exposure is needed to bring out detail.

A Guide to Enlarging and Printing Papers

Photographers have a wide choice among the papers that produce a finished photographic enlargement or contact print. Surfaces range from glossy smooth through several textures and the shades of black created may be warm, neutral or cold. Most brands are sold in a choice of

Standard Enlarging Papers

	Manufacturer and Brand	Smooth Glossy	Smooth Luster	Smooth Matte	Fine Grained Luster	Rough	Silk Luster	Textured
Warm Tone	AGFA Record Rapid	SW 2-4, DW 2-4			DW 2-4			
	AGFA Portriga Rapid	DW 2-4						
	DUPONT Emprex		DW		DW	DW	DW	
	GAF Allura		DW		DW	DW	DW	
	GAF Cykora	SW 1-4, DW 1-3			DW 1-4		DW 1-3	
	GAF Indiatone				DW		DW	
	GAF PP-675 Panchromatic				DW	DW	DW	
	KODAK Ektalure				DW		DW	DW
	KODAK Medalist	SW 1-4, DW 2-3	DW 1-4		DW 1-4		DW 1-3	
	LUMINOS Portrait DeLuxe Rapid				DW 1-3		DW 1-3	
	LUMINOS Portrait Proof		MW			MW		
	LUMINOS Charcoal-R							DW
Neutral to Cold Tone	AGFA Brovira	SW 1-6, DW 1-6			DW 2-5			
	DUPONT Velour Black	SW 1-4, DW 1-4	DW 2-3	SW 1-4, DW 1-4	DW 1-4		DW 1-3	
	GAF Jet	SW 1-4	DW 2-4		DW 1-4			
	KODAK Kodabromide	SW 1-5, DW 1-5	LW 1-5 SW 1-5, DW 1-4		SW 1-5, DW 1-5			

weights and contrast grades (by selecting the proper grade, you can correct for insufficient or excess contrast between tones in the negative). Weights and grades are shown in the tables by symbols *(see footnotes).* A special type of paper has variable contrast: it is not made in grades but the degree of contrast of the print can be adjusted by using filters of different colors in the enlarger.

Variable Contrast Papers

	Manufacturer and Brand	Smooth Glossy	Smooth Luster	Smooth Matte	Fine Grained Luster	Rough	Silk Luster	Textured
Warm Tone	KODAK Polycontrast	SW, DW	LW, SW, DW		DW			
Warm Tone	KODAK Polycontrast Rapid	SW, DW	SW		DW		DW	
Warm Tone	KODAK Polylure	SW, DW			DW		DW	DW
Neutral to Cold Tone	DUPONT Varigam	SW, DW	SW, DW		DW		DW	
Neutral to Cold Tone	DUPONT Varilour	SW, DW	SW, DW	SW, DW			DW	
Cold Tone	AGFA Gevagam	SW, DW						
Cold Tone	GAF VeeCee Rapid	SW, DW		SW, DW				

Contact Printing Papers

Warm Tone	GAF Lustrex	SW 1-3			DW 1-3		DW 1-3	
Neutral Tone	GAF Cyko	SW 1-4, DW 2-3						
Neutral Tone	ILFORD Industrial Contact	SW 1-5, DW 1-4						
Neutral Tone	KODAK Azo	SW 0-5, DW 0-4	DW 1-4		SW 0-5, DW 1-4			
Neutral Tone	LUMINOS Luminos Contact Paper	SW 0-3						
Cold Tone	KODAK Velox	SW 1-4						

Letter and numeral symbols: LW—Light-weight SW—Single-weight MW—Medium-weight DW—Double-weight

0—high contrast negatives
1—moderate contrast negatives
2, 3—average negatives
4, 5—moderately low contrast negatives
6—very low contrast negatives

How to Store a Temporary Darkroom

If you carefully clean up and store your equipment and materials after a session in the darkroom, you'll find it much easier to get ready for the next processing session. All the trays and tanks you have been using should be thoroughly rinsed out. If you have not already done so, color-code your trays with small pieces of masking tape, using one color for the developer tray, one for the stop-bath tray, one for the fixer tray and another for the washing tray. The color-coding makes it easier to be certain that you use the same tray for the same purpose each time; that way even if traces of chemicals remain in the trays after rinsing, there is no risk of contamination when the trays are re-used. Shroud the enlarger head with a large plastic bag tied at its mouth to keep dust away from the lens and negative carrier.

Some film developers, stop bath and fixers that have not been exhausted can be re-used and should be stored in labeled dark plastic bottles. Re-using paper developers is not recommended. Never return used solutions to the containers of fresh stock, however, for they will dilute and weaken it. Many photographers tape shut boxes of enlarging paper to make certain that they are not accidentally jarred open. Finally, try to store all equipment neatly and securely in one place, making use of a cabinet, as below, or shelves of a deep closet. Be especially careful that the enlarger is stowed so that it cannot fall.

A cabinet makes a convenient storage area for a darkroom. Trays, enlarger, blotter roll, chemical bottles, papers and other items can be stored on the same shelf.

For their help in preparing this handbook, the editors are indebted to Richard O. Pollard, Director of Photography, LIFE magazine, and to John Loengard and other members of the LIFE photographic staff; to the following members of the TIME-LIFE Photo Lab: George J. Karas, Chief; Herbert G. Orth, Deputy Chief; Gerard J. Lowther, Black and White Production Supervisor; Peter Christopoulos, Color Lab Technician; and to Norman Rothschild, Technical Editor, *Popular Photography;* Robert E. Mayer, Manager, Photographic Services, Bell & Howell Co.; and David Vestal, Associate Editor, *Travel and Camera* and *Camera 35.* The photographs used in Part I of this handbook were taken by Charles Bonnay, Anthony Donna, Ken Kay, John Loengard, Ralph Morse, Norman Rothschild and John Senzer. The photographs that are reproduced in Part II were taken by Ken Kay.

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